Combined Science HT- Biology - KS4
Homeostasis and Response

The Nervous System and Homeostasis Review Lesson - Higher

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OAK NATIONAL ACADEMY

Copy and complete

State where the receptors to each of these stimuli are found:

Stimulus	Location of receptors
Light intensity	
Temperature	
Pressure	
Sound	

Answers

State where the receptors to each of these stimuli are found:

Stimulus	Location of receptors
Light intensity	Eyes
Temperature	Skin
Pressure	Skin
Sound	Ears

Skin receptor density

Location	Density (per mm²)
Fingertips	5
Bicep	0.4
Thigh	0.05

In which location are the receptors found closest together?

Why are injections commonly given in the bicep or thigh?

The eye has a light receptor density of 8 per mm², the fingertips have a light receptor density of 0 per mm². What stimulus do each of these locations receive?

The eye also contains pressure receptors, why is this?

Answers

1. In which location are the receptors found closest together?

   Fingertips

2. Why are injections commonly given in the bicep or thigh?

   The receptors are less dense/more spread out in these areas.
   It will be less painful as less receptors will be stimulated.

Answers

3. The eye has a light receptor density of 8 per mm^2, the fingertips have a light receptor density of 0 per mm^2. What stimulus do each of these locations receive?

Eye - light reflected into the eye
Fingertips - pressure/temperature

4. The eye also contains pressure receptors, why is this?

Detect when something is in the eye that could potentially cause damage e.g. an eyelash that has fallen into the eye.

Explain why you think phantom limb pain occurs after a limb has been amputated.

Answer

- Brain may remap that part of the body's sensory circuitry to another part of the body.
- Damaged nerve endings
- Scar tissue

Copy and complete

	Nervous Control	**Hormonal control**
What is the signal?	Electrical	
How is it transported?		Blood stream
Where does it travel to?	Effectors (muscles or glands)	
How quick is this process?		Slow
How long does this process last?	Short lasting	
How widespread are the effects?		Effects are seen around the body

Copy and complete

	Nervous Control	Hormonal control
What is the signal?	Electrical	**Chemical**
How is it transported?	**Neurones/nerve cells**	Blood stream
Where does it travel to?	Effectors (muscles or glands)	**Target cells/organs**
How quick is this process?	**Rapid**	Slow
How long does this process last?	Short lasting	**Long lasting**
How widespread are the effects?	**Localised**	Effects are seen around the body

Receptors detect the change and send a signal to the coordination centre

Responses activated at the effectors/ target organs

Conditions return to normal and responses are switched off.

Condition increases

Condition decreases

Normal body conditions

Normal body conditions

Condition increases

Receptors detect the change and send a signal to the coordination centre

Responses activated at the effectors/ target organs

Conditions return to normal and responses are switched off.

Condition decreases

Receptors detect the change and send a signal to the coordination centre

Responses activated at the effectors/ target organs

Conditions return to normal and responses are switched off.

Normal blood glucose concentrations

Glucose concentration increases

Receptors detect the change and send a signal to the coordination centre

Response?

Conditions return to normal and responses are switched off.

Glucose concentration decreases

Receptors detect the change and send a signal to the coordination centre

Response?

Conditions return to normal and responses are switched off.

Normal blood glucose concentrations

Glucose concentration increases

Receptors detect the change and send a signal to the coordination centre

The pancreas releases insulin. This stimulates the liver cells to convert glucose into glycogen.

Conditions return to normal and responses are switched off.

Glucose concentration decreases

Receptors detect the change and send a signal to the coordination centre

The pancreas releases glucagon. This stimulates the liver cells to convert glycogen into glucose..

Conditions return to normal and responses are switched off.

Quick questions

1. Name a hormone that IS controlled by negative feedback.

2. Name a hormone that is NOT controlled by negative feedback.

3. True or false - negative feedback is a continuous cycle.

4. True or false - glycogen is insoluble.

Quick questions

1. Name a hormone that IS controlled by negative feedback. **Thyroxine**

2. Name a hormone that is NOT controlled by negative feedback. **Adrenaline**

3. True or false - negative feedback is a continuous cycle. **True**

4. True or false - glycogen is insoluble. **True**

Exam style questions

1. Explain the effect an insulin injection has on the body. [3]

2. Explain why the concentration of glucagon in the blood is higher when you wake up in the morning than after a meal. [4]

Exam style questions

1. Explain the effect an insulin injection has on the body. [3]

   Insulin travels in the blood and stimulates the liver cells to convert glucose into glycogen. This reduces the blood glucose concentration.

2. Explain why the concentration of glucagon in the blood is higher when you wake up in the morning than after a meal. [4]

   Glucagon is released by the pancreas when blood glucose concentrations are low. Blood glucose levels are low when you first wake up as it has been a long time since your last meal. Glucagon stimulates the liver cells to convert glycogen into glucose so that there is enough glucose for respiration to occur.